

REMARKS

Applicant would like to thank the Examiner for the courteous telephone discussion with the undersigned Counsel on December 2, 2008. During that discussion, Counsel summarized the approach of the amendments hereof, and the reasons that the claims, as amended, distinguish over the cited prior art. The Examiner indicated that he would be receptive to the approach, in the context of an RCE, although no firm commitment was given.

Claim 1 has been amended to include the limitations of claims 41 and 36, which have, in turn, been cancelled. Specifically, amended claim 1 recites, in step (3) thereof: "repeating step 1) numerous times wherein the region which corresponds to each repeat intersects the region of step 1) and wherein the melted material is displaced during the numerous repetitions of step 1) such that either or each of the said projection or hole are increased in size in comparison with their respective size following a preceding application of step 1). Claim 42 has been amended, consistent with the amendment of claim 1.

The amended claims patentably distinguish over the art of record, which is summarized next.

The Volkmann et al. U.S. Patent 4,861,407 discloses a method for bonding a first body to a second body, and for pretreating the first body by placing it in the path of an energy beam. The first body is placed in the path of a beam having a selected energy density for a duration effective to form projections on the metallic substrate of the first body, the projections being formed by evaporation and/or melting of the metallic

substrate, substantially all of the projections being less than 20 micrometers in height (see e.g. col. 2 line 62 through col. 3, line 2, or col. 3, lines 41-48 of the citation).

Volkmann et al. indicate, at column 5, that "as long as the energy density for treating the surface is maintained, the relative movement between the laser beam path and the surface to be treated can be as fast as possible," and that preferably, "each area treated overlaps just a little with the area treated previously so that 100% treatment results" (col. 5, lines 36-41).

The Clarke U.S. Patent 6,176,959 discloses a method for bonding two surfaces. A laser beam is directed at one or both surfaces to effect "microtexturizing" or "roughening" of the surface(s) by forming depressions and whisker projections, as shown in Figure 1 of Clarke. Thereafter, an adhesive is applied to at least one of the surfaces and the surfaces are then placed against each other for bonding. As indicated at columns 2 and 3 of Clarke, the laser beam is first used to clean and glaze the surface to obtain an oxide layer of thickness of preferably from 200 to 600 Angstroms, followed by roughening to obtain a surface preferably from about 75 to 125 Angstroms thick.

As Applicant has previously noted, the cited prior art discloses the use of power beams to roughen a surface. The background portion of Applicant's specification acknowledges the existence of these types of techniques in the prior art (see e.g. page 2 thereof, and references to "surface texturing," etc.). In contrast, the present invention involves the formation of special structures that are more complex and larger than are possible with techniques of the prior art.

At page 3, first paragraph, the Office Action states:

“Repeating the surface treatment described by Volkmann et al would have been obvious at the time applicant’s invention was made to a person having ordinary skill in the art in a manner similar to sanding the surfaces of two workpieces in order to get superior bonding.”

This assertion is fundamentally incorrect. “Sanding” such as by the motion of grinding particles on abrasive papers is a random process applied to a general region in order to maximize the roughened area for improved bonding. A notable feature about sanding is that if one continues to sand the surface, after a short while all that occurs is the general removal of material without any increase in the roughness of the surface on a microscopic level – the surface itself is generally removed. This is not at all like the claimed process.

Both applied citations are directed to roughening of surfaces, and neither of them is directed to building of structure with holes and projections, involving repetition of melting and solidification in the manner claimed, much less the numerous repetitions recited in the amended claims. Indeed, Clarke has no teaching whatsoever of any return Clarke or remelting. In Volkmann et al. '407, there is also no such teaching. The reference in Volkmann et al. to “just a little overlap” (col. 5, lines 30-45) is stated to be for the purpose of “100 percent treatment,” and is certainly not for the purpose of any repetitive structure building. In the outstanding Office Action, the Examiner also references col. 14, lines 36-40 of Volkmann et al. which are part of Volkmann’s Example 6, and state:

“The panels are translated back and forth through the laser beam at 12 mm/sec to completely

treat one side of each panel with about a 150 percent overlap of each pulse treated area."

As discussed with the Examiner during the above-referenced telephone discussion, it is clear that the reference to translation "back and forth" pertains to getting complete treatment of a side of a panel being treated and does not pertain to going back and forth over individual pulse treated areas. The objectives are different, the techniques are different, and the results are different.

Differences between the structures resulting from the technique of the claimed invention and the technique of Volkmann et al. '407 can be better understood by comparing the photomicrographs of the respective disclosures. For example, Applicant's Figures 13 and 14 show, respectively, a projection and an array of projections produced by numerous visits of the beam to each location that has been initially melted, with repeated displacement of melted material that had been at least partially solidified in a prior stage of the process, as defined by Applicant's claims. (Reference can also be made to the diagrams of Applicant's Figures 2-6, which illustrate the steps of the process and how the structure is formed.) Compare this, for example, to Figures 2A and 2B of Volkmann et al. (or other Figures in Volkmann et al. showing the magnified treated surfaces). It is evident that each treated region of Volkmann et al. has not been repeatedly intersected, numerous times, with respective displacements of at least partially solidified and remelted material, as required by Applicant's amended claims. The differences in resultant structures are particularly striking. Volkmann et al. strive for a roughened surface, and this is what their process

achieves. Compare this to the formation of the predetermined shapes of projections and holes made by Applicant's claimed process. Stated another way, while the cited prior art teaches "roughening" of workpieces, Applicant's claimed technique achieves "sculpting" of the workpiece to obtain desired shapes (see e.g. page 24 of the Specification where Applicant uses this term).

Applicant has also pointed out that Volkmann et al. teaches away from using the power beam thereof to repetitively build structure, much less in the way defined by the method of Applicant's amended claims. At column 2, lines 11-24, Volkmann et al. describe a prior reference that produces projections greater than 20 micrometers in height, and then, in summarizing the improvement of their invention, in the paragraph bridging columns 2 and 3, indicate that substantially all the projections to be produced by their invention are less than 20 micrometers in height. Then, in Example 28, Volkmann et al. describe a test that demonstrates the relative disadvantage of the prior art process, with its projections in the range 20 to 45 micrometers. Thus, a person skilled in the art, having practiced the Volkmann et al. technique, would recognize, in accordance with the Volkmann et al. teachings, that the coverage of the surface described in Volkmann et al. would be enough to achieve the intended effect and that a further treatment would serve no purpose. Indeed, it would defeat the Volkmann et al. purpose of keeping projections less than 20 micrometers in height. It is therefore evident that a skilled person would certainly not be motivated to try to apply the Volkmann process repeatedly, much less the numerous times, and in the

particular fashion, defined by Applicant's amended claims. As demonstrated, not only is there no incentive in the Volkmann et al. citation to modify its technique in the manner proposed by the Examiner (e.g. at the top of page 3 of the Office Action), but the facts show that Volkmann et al. actually teach away from such modification.

At page 6, the Office Action stated:

"In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986)."

Applicant has reviewed the Keller, supra, and Merck & Co., supra, cases, and they do generally support the legal principle for which they have been cited. However, Applicant respectfully points out that said principle (namely, that "one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references") is not applicable to the situation at hand. In the rejections set forth in the present and prior Office Actions, none of the claims were rejected over a combination of plural references. Rather, all claims have been rejected as being obvious over the single citation, Volkmann et al. '407, and have also been rejected as being obvious over the single citation, Clarke. Thus, Applicant was justified, indeed compelled, to rebut each of the citations individually.

In view of the foregoing, it is believed that all claims of this application are now in

condition for allowance, and such favorable action is respectfully solicited. In the event there are any remaining issues, however, it is asked that the Examiner kindly telephone the undersigned counsel collect so that they can be resolved.

Respectfully submitted,

  
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